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RESEARCH PAPER

Comparative analysis of primary metabolites of three medicinal plants

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ABSTRACT : The plants have long served as a major source of medicinal compounds. Medicinal plants are value added for the contents and the chemical composition of their active components. Therefore, the demand of plant based therapeutics has increased many folds because they are natural products, being non-narcotics, having no side effects and easily available at affordable prices. The goal of the present investigation was to estimate soluble sugar, chlorophyll, protein, lipids, phenols and starch from different plants. The highest amount of protein (46.87%), chlorophyll (1.63%) and starch (57.23%) was found in *Mangifera indica*, suluble sugar (68.75) and lipid (0.03%) was found highest in *Moringa oleifera* and the highest phenol (0.013%) was obtained from *Psidium guajava*.

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Plants have been a rich source of medicines because they produce a host of bioactive molecules, most of which probably evolved as chemical defense against predation or infection (Cox and Balick, 1994). Plants play a significant role in providing primary health care services to rural people. They serve as therapeutic agents as well as important raw materials for the manufacture of traditional and modern medicine (Khandelwal *et al.*, 2011). Substantial amount of foreign exchange can be earned by exporting medicinal plants to other countries. In this way indigenous medicinal plants play significant role of an economy of a country (Verma *et al.*, 2009). Indian subcontinent is a vast repository of medicinal plants that are used in traditional medicinal treatments. Around 20,000 medicinal plant species have been recorded (Dev, 1997), about 500 plants with medicinal use are mentioned in ancient texts and around 800 plants have been used in indigenous system of medicinal plants as potential source of bioactive compounds (Prusti *et al.*, 2008). The use of medicinal plants is not just a custom of the distant past. Approximately 90 per cent of the world's population still depends on medicinal extracts (Duke, 1985). According to a survey 23 per cent of Canadians uses herbal medicines. In addition, as much as 25 per cent of modern pharmaceutical drugs contain plant ingredients (Duke, 1997). About 50 per cent to 60 per cent of pharmaceutical drugs are either of natural origin or obtained through use of natural products as starting points in their synthesis (Balandrin *et al.*, 1993).

Plants, as extracts and in various other forms, are being used for centuries in different traditional system of medicine for the treatment of human ailments, particularly those caused by pathogenic bacteria, fungi, as well as virus (Ray *et al*., 2004). Presence of various compounds and their uses has extensively been emphasized by number of workers (Despande *et al*., 1980; Dougal, 1981; Collins, 1987). Demand on plant based therapeutics has increased many fold because they are natural products having no side effects and easily available at affordable prices (Govil *et al*., 2002). The goal of present work is to analyze primary metabolites which are directly concerned with metabolic processes like – respiration, photosynthesis, protein, lipid synthesis.

RESEARCH METHODOLOGY

In the proposed work different species *Mangifera indica, Moringa oleifera* and *Psidium guajava* were collected from School of Forestry, Allahabad Agricultural Institute-Deemed University and Allahabad. Fresh leaves were washed and dried in an incubator at 37^0C and make its powder. This powder was later used for further analysis such as total soluble sugar and chlorophyll (Sadasivam and Manickam, 1992), protein Lowry *et al.* (1951), total lipids (Folch *et al.*, 1957; Bligh and Dyer, 1959), total phenols (Bray and Thorpe, 1954; Malick and Singh 1980; Mayr *et al.*, 1995), starch (Dobois *et al*., 1951), respectively.

RESULTS AND DISCUSSION

The present study was conducted on leaf samples of three medicinal plants *viz., Moringa oleifera, Psidium guajava* and *Mangifera indica*. It was found that the highest percentage of soluble sugar (68.75%) was present in leaves of *Moringa oleifera* whereas *Psidium guajava* showed the least percentage of soluble sugar (29.15%). On the other hand total protein content of *Mangifera indica* was the highest (40%) and *Moringa oleifera* was the lowest (9.84 %). Although the total lipid content of *Psidium guajava* and *Mangifera indica* and *Moringa olefera* was found 0.01 g and 0.02 g 0.03g, respectively. There was not much difference in total phenol content (approximately 1 %) of leaf samples of the three plants in present study, however, leaves of *Moringa oleifera* was found to be richer in total chlorophyll content (1.63 mg/g) than leaf samples of other two plants. *Mangifera indica* has the highest starch content (57.23%) as shown in Table 1. These results are suggestive of primary bioactive compound of commercially importance and may result in great interest in plants pharmaceuticals. Therefore, medicinal use depends partially on the quantitative and qualitative aspects of their organic reserves, especially soluble sugar, proteins, lipids, phenols and chlorophyll. These primary metabolites further can be used for biosynthesis of secondary metabolites or bioactive compounds.

Gehad and Sherbini (2013) evaluated *Mangifera indica* extracts of immature fruits for inhibition of larval development. In the phytochemical analysis, tannings and flavonoids were the metabolites identified. Aqueous extracts of immature fruits at 100mg/ml showed 100 per cent inhibition of larval development. *In vitro* results indicate that this fruit could assist *S.stercoralis* control. Atawodi *et al*. (2003) was analyzed the plant for polyphenol content as well as *in vitro* antioxidant potential. The methanol extract of the leaves of *M.oleifera* contained chlorogenic acid, rutin, quercetin glucoside and kaempferol rhamnoglucoside whereas in the root and stem barks, several procyanidin peaks were detected. With the xanthine oxidase model system, all the extracts exhibited strong *in vitro* antioxidant activity, with 50 per cent inhibitory concentration (IC (50) values of 16,30 and 38 microl for the roots, leaves and stem bark, respectively. Similarly, potent radical scavenging capacity was observed when extracts were evaluated. The high

Table 1: Results showing the total amount of primary metabolites present in different medicinal plants (*Moringa oleifera, Psidium guajava* and *Mangifera indica*)

Name of the sample plant	Primary metabolites					
	Total soluble sugar %	Total protein %	Total lipid %	Total phenol %	Chlorophill %	Starch %
Moringa oleifera	68.75	9.84	0.03	1.012	0.675	51.26
Psidium guajava	29.15	29.15	0.01	1.013	1.09	13.25
Mangifera indica	46.87	46.87	0.02	1.001	1.63	57.23

antioxidant radical scavenging effects observed for different parts of *M.oleifera* appear to provide justification for their widespread therapeutic use in traditional medicine in different continents. Chen *et al*. (2007) reported that leaves of *Psidium guajava* contain huge amounts of soluble polyphenolics including gallic acid, cathechin, epicatechin, rutin, quercetin and to exhibit potential anticancer activity. However, reconstruction of these polyphenolics recovered only 40 per cent of the original bioactivity and the soluble carbohydrates portion in budding leaves was suspected to contribute the remaining.

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